REMARKS/ARGUMENTS

The various issues raised in the Final Office Action will be considered below under the same headings that appear in the Final Office Action.

Response to Arguments

Beginning on page 2 of the Final Office Action, comments are provided by the Examiner regarding the claimed limitation of "each of the power sources is responsive to the sensed power supply voltage for supplying a regulated current or a regulated power to the power distribution network". This limitation appeared in former claim 1 and has also been maintained in the claim. As noted by the Examiner, the Applicants interpret the claimed limitation as conveying the feature that each of the power sources is responsive to the same sensed power supply voltage for supplying a regulated current or a regulated power. However, the Examiner appears to believe that this interpretation implies limitations which are not found in the claim.

With respect, the Examiner's position is not entirely understood at least in the context of claim 1. This claim explicitly recites at least one voltage sensor for sensing power supply voltage at at least one point in the power distribution network, and also recites that each of the power sources is responsive to the sensed power supply voltage for supplying a regulated current or a regulated power to the power distribution network. Thus, according to the claim, the power sources are all responsive to the same power supply voltage. The claim clearly recites that each power source is responsive to the sensed power supply voltage. This is entirely consistent with the Applicants' interpretation of this claim limitation.

Regarding the same claim limitation, page 3 of the Final Office Action correctly notes that the recitation of "at least one voltage sensor" does not prohibit the sensed voltage from being sensed from more than one point in the power distribution network. The claimed distributed power supply arrangement may have voltage sensed at multiple points and may regulate current or power in response thereto.

In a multiple sensor embodiment, all of the power sources would still be responsive to the same sensed voltages. Where there is one voltage sensor and one sensed voltage, the power sources are responsive to that sensed voltage. If multiple voltages are sensed by multiple voltage sensors, then each power supply remains responsive to the sensed voltage, which in this case would include the same set of multiple voltages.

It appears as though perhaps the multiple voltage sensor and multiple sensed voltage scenario is the Examiner's primary concern with respect to the Applicants' interpretation of the claim limitation. Although the Applicants believe that the wording of the claim limitation in former claim 1 correctly recited the Applicants' interpretation, the preceding listing of claims incorporates a proposed amendment to claim 1 in an effort to place the application into allowable form. In particular, the Applicants propose to amend claim 1 to recite that each of the power sources is responsive to the sensed power supply voltage sensed by each of the at least one voltage sensor for supplying a regulated current or a regulated power to the power distribution network. It should be abundantly clear from the amended claim that each power source is responsive to the same voltage or voltages sensed by the at least one voltage sensor for supplying a regulated current or a regulated power. If there is one sensed voltage, then each power source is responsive to that sensed voltage, and if there are multiple sensed voltages, then each power supply is responsive to each of the multiple sensed voltages.

The other independent claims 9 and 15 have been amended in a similar manner as claim 1, and explicitly recite this claim limitation as well.

Page 3 of the Final Office Action also provides comments regarding the Applicants' remarks regarding the fact that U.S. Patent No. 4,538,073 (hereinafter "Freige") does not disclose the claimed feature of supplying a regulated current or a regulated power to a power distribution network responsive to sensed power supply voltage. As noted in the Applicants' previous correspondence, current limiting in Freige is not responsive to power supply voltage, and any regulation in Freige that is responsive to sensed voltage is actually voltage regulation and not current regulation or power regulation.

The Examiner correctly notes at the bottom of page 3 of the Final Office Action that Freige does state that voltage regulation is accomplished by sensing an output voltage. This is consistent with the Applicants' previous remarks. Voltage regulation is responsive to sensed output voltage. The Examiner also correctly notes that Freige refers to power module current voltage output regulation at line 34 of column 6, and subsequently discusses current regulation at lines 35 to 50. This discussion of current regulation in Freige is also consistent with the Applicants' previous remarks, in that the current regulation is not responsive to a sensed output voltage.

Therefore, it should be abundantly clear that there are substantive differences between the teachings of Freige and the claims of the present application in respect of the types of regulation and the parameters to which such regulation is responsive.

While this is clearly acknowledged at the bottom of page 3 of the Final Office Action, the Examiner concludes that the teachings present in Freige properly anticipate the claim limitations of regulation, despite differences in the type of regulation and response. This conclusion, however, is not consistent with 35 U.S.C. 102, which clearly requires that an invention was patented or described in a printed publication. It therefore appears as though these substantive differences between the claimed subject matter and the teachings of Freige are improperly being dismissed for the purposes of the anticipation analysis. In light of differences between Freige and the claimed subject matter, there is no anticipation. The claims do not simply define regulation in such a broad sense that might potentially fall under the teachings of Freige. The claimed subject matter recites a specific type of regulation that is responsive to a specific parameter.

The Final Office Action, at page 4, includes comments regarding the Applicants' previous remarks relating to claim 2 and each power source being responsive to the same set of voltages. As discussed in detail above in the context of claim 1, it is believed that the recitation of responsiveness as it appeared in former claim 1 was clear and explicit in the sense of conveying the feature that each power source is responsive to the same set of one or more sensed power supply voltages for supplying a regulated current or a regulated power. However, since an amendment in the recitation of this feature has been proposed in claim 1, a further related

amendment is proposed for claim 2. The Applicants propose to amend claim 2 to recite ", whereby each of the power sources is responsive to the power supply voltages sensed at the plurality of points in the power distribution network". Thus, the claim clearly recites that each of the power sources is responsive to the power supply voltages.

The Applicants also propose to amend claim 19 in a similar manner as claim 2.

Finally, the Examiner commented on the Applicants' remarks with respect to claim 3 explicitly reciting a form of "spatial" average over multiple sensing points. The Applicants note that this specific term was included in the previous remarks in an effort to convey an understanding of the subject matter of the claim to the Examiner. Surely the Examiner can appreciate that there are different ways to define or explain the same subject matter, and sometimes different terminology can be useful in understanding the particular subject matter to which a claim is directed.

In any case, this was the Applicants' intention when including the term "spatial" in the previous remarks. The Examiner correctly noted that this particular term does not appear in claim 3. However, it is believed that a skilled person would readily understand that an average of the sensed power supply voltages, which according to claim 2 are sensed at a plurality of points in the power distribution network, would be a spatial average. In a further effort to place the application into allowable form, a clarifying amendment to claim 3 has been proposed in the preceding listing of claims. It is proposed to amend claim 3 to explicitly recite that each of the power sources is responsive to an average of the sensed power supply voltages sensed at the plurality of points in the power distribution network for supplying said regulated current or regulated power to the power distribution network.

Claim 10, like claim 3, defines an average of sensed voltages, and therefore the Applicants propose to amend claim 10 in a similar manner as claim 3.

It should be readily apparent that the proposed claim amendments are intended to clarify features that were previously recited in at least some of the claims. Since the Examiner should have therefore considered those features during examination, it would appear as though the claim amendments should not require a further search or examination.

At the very least, the claim amendments place the application into condition for allowance. In the event that the Examiner is not in agreement that the amended claims are allowable, then the proposed claim amendments would place the application into better form for appeal.

Since the foregoing features were believed to be clearly recited in the former claims, the presently proposed claim amendments were not previously submitted.

For at least these reasons, the Applicants believe that the claim amendments should be entered, and respectfully request entry of those amendments.

In light of the foregoing, the Applicants further respectfully request favourable reconsideration and allowance of the application. For completeness, a revised version of the previously submitted remarks is provided below in response to the claim rejections under 35 U.S.C. 102 and 35 U.S.C. 103.

Claim Rejections - 35 U.S.C. 102

Claims 1, 2, 4, 9, 15, 16, and 19 were rejected under 35 U.S.C. 102(b) as allegedly being anticipated by Freige.

Freige discloses a modular power supply system including power modules and DC-to-DC convertors. Multiple power modules and DC-to-DC convertors may be interconnected such as shown in Figure 4. The power modules produce a first fixed regulated DC voltage which is distributed to the system modules. The DC-to-DC convertors change the first DC voltage to a second regulated DC voltage. Figures 2 and 3 of Freige respectively show schematic diagrams of a power module and a DC-to-DC convertor. In the analysis of the rejected claims, page 5 of the Final Office Action makes reference to Figure 4, the application of the modular power supply system in Figure 1, and the schematic diagram in Figure 2 of Freige.

It is respectfully submitted, however, that each of the rejected claims incorporates features which have not been disclosed or suggested in Freige.

With reference first to claim 1, as noted above, the final clause of the claim recites that each of the power sources is responsive to the sensed power supply voltage sensed by each of the at least one voltage sensor for supplying a regulated current or a regulated power to the power distribution network. This recitation in claim 1 actually includes two features which distinguish the claim over Freige. The cited reference fails to disclose or suggest that each of a plurality of power sources is responsive to the same sensed power supply voltage sensed by each of at least one voltage sensor, and also fails to disclose or suggest supplying a regulated current or a regulated power responsive to such sensed voltage.

Regarding power supply control, page 5 of the Final Office Action refers to the discussion of voltage regulation at Column 6, lines 50 to 60 of Freige. The referenced passage of Freige relates to Figure 2, and discloses that voltage regulation is accomplished by sensing an output voltage coupled through resistor R27 to resistor divider circuit R20/R22. Although Freige refers to a resistor divider circuit R20/R22, it appears the divider is actually formed by R27 and R22. R22 appears to provide input impedance as part of the frequency compensation network around the error amplifier of IC2.

A constant reference voltage level of 2.75 volts DC is maintained at a node formed by the resistors R20/R22. As the voltage output produced by the power module varies, deviation from the constant reference voltage is detected at reference/comparator integrated circuit IC2. This device is typically a TL431 available from Texas Instruments and many other companies. It includes an operational amplifier and a 2.495V voltage reference, and is often used as the error amplifier and voltage reference in power supplies. It was originally marketed as a shunt regulator, which is likely why a Zener-like symbol is used in Figure 2 of Freige.

An error output signal produced by the integrated circuit IC2 is coupled through resistors R19/R14 to the base of transistor switch Q4. In this way, conduction of transistor Q4 is adjusted to maintain the switching action of transistor Q8 such that a constant output voltage is provided.

The Applicants note that Figure 2 of Freige shows a single power module. Multiple power modules 10a to 10n may be coupled together as shown in Figure 4. Each power module 10a to 10n would have a structure as shown in Figure 2. Each power module would thus

incorporate a respective set of output voltage sensing resistors R27, R20, R22 and a respective reference/comparator integrated circuit IC2 for providing its own voltage regulation. With respect, the Applicants submit that such *per-power module* regulation does not disclose the claimed feature that each power source is responsive to sensed power supply voltage sensed by each of at least one voltage sensor.

Claim 1 clearly recites that each of the power sources is responsive to "the" sensed power supply voltage sensed by each of the at least one voltage sensor. This is quite different from the voltage sensing and power module control mechanism disclosed in Freige. As noted above, each power module in Freige senses output voltage and uses its own sensed output voltage in voltage regulation. Claim 1, however, recites that each power supply is responsive to the same sensed power supply voltage. Thus, there is no anticipation of claim 1 by Freige.

The feature of supplying a regulated current or a regulated power to the power distribution network responsive to the sensed power supply voltage, as recited in claim 1, also appears to be absent from Freige. While Freige refers to current regulation at lines 34 to 49 of Column 6, what is actually disclosed is current limiting. With reference to Figure 2 of Freige, the integrated circuit U10, resistors R29, R30, and capacitors C26, C27 form a current limiting circuit. The integrated circuit U10 provides a compare function and produces an appropriate output signal which is coupled through the resistor R15 to the emitter of transistor Q4. In this way, current flow through the transistor Q4 is controlled. (See Column 6, lines 34 to 42.)

From a review of Figure 2 and particularly the current limiting circuit and transistor Q4, it would be readily apparent to any person skilled in the art that the current limiting function is not responsive to a power supply voltage that is sensed in a power distribution network. The current limiting circuit does not sense the output voltage of the power module. Thus, although current flow through transistor Q4 is limited by the current limiting circuit, such limiting is not responsive to power module voltage. Supplying a regulated current or a regulated power to the power distribution network, as recited in claim 1, further distinguishes the claim over Freige.

The limited current through transistor Q4 is also not supplied to a power distribution network. Therefore, even if one were to consider the limited current through Q4 as being a regulated current, this current is not a supply current as recited in claim 1.

The Applicants also wish to note that Freige concentrates primarily on providing a regulated voltage at the output of the disclosed power module. Limiting of the current flow through transistor Q4 contributes to control of the main power supply switching transistor Q8, but does not in any way regulate output current or power. Freige repeatedly refers to regulation and control of output voltage levels only. It appears as though the notions of output current regulation and output power regulation are entirely absent from Freige.

Regarding claim 2, this claim recites a plurality of voltage sensors for sensing power supply voltages at a plurality of points in the power distribution network. According to the claim, each power source is responsive to the power supply voltages sensed at the plurality of points in the power distribution network. As noted above, each power module in a multiple-module system in Freige would include an output voltage sensing arrangement and perform voltage regulation only in response to its own sensed voltage.

Claim 2 is thus also not anticipated by Freige.

Freige does not disclose regulated current sources, and therefore claim 4 is not anticipated. Since claim 4 depends from claim 1, it also distinguishes over Freige for the same reasons as claim 1.

Independent claim 9, similar to claim 1, recites regulating current supplied by each of a plurality of power sources to a power distribution network in dependence upon sensed voltage of supplied power sensed at each of at least one point in a power distribution network. Current regulation for a plurality of power sources based on the same sensed voltage appears to be absent from Freige, as discussed above.

Independent claim 15 similarly recites at least one power supply voltage sensor for sensing a power supply voltage at a respective point in a power distribution network for regulating the power supplied to the power distribution network from a plurality of power

sources. Each of the power sources is responsive to the sensed power supply voltage sensed by each of the at least one power supply voltage sensor for supplying a regulated power to the power distribution network. Claim 15 thus distinguishes over Freige for similar reasons as claims 1 and 9.

Claim 16, similar to claim 4, recites regulated current sources, and this distinguishes the claim over Freige. The claim also depends from claim 15 and includes the distinguishing features from claim 15 as well.

Claim 19 depends from claim 15 and also distinguishes over Freige. It is noted that claim 19 further recites the feature of a plurality of sensors for sensing our supply voltage in the power distribution network, similar to claim 2, and additionally distinguishes over Freige for this reason.

In light of the foregoing, it is respectfully submitted that each of the rejected claims 1, 2, 4, 9, 15, 16, and 19 includes features that have not been disclosed or even suggested in Freige. Reconsideration and withdrawal of the rejections under 35 U.S.C. 102 are respectfully requested.

Claim Rejections - 35 U.S.C. 103

Claims 3 and 10 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Freige in view of United States Patent No. 3,909,702 (hereinafter "Hart"). It is alleged on page 6 of the Final Office Action that Hart teaches regulation circuitry wherein power sources are responsive to an average of sensed power supply voltages. The Applicants acknowledge that Hart refers to sensing the average voltage of load 105 and varying circuit switching. However, even if one were to combine such teachings of Hart with those of Freige, which the Applicants in no way concede would be obvious, the combined teachings would not render the subject matter of claims 3 and 10 unpatentable.

On page 6 of the Final Office Action, it is suggested that it would be obvious "to modify Freige to sense the average current in order to provide a stable output power to the loads average power requirements". This statement is not entirely understood, since Hart does not refer to current sensing, and the rejected claims 3 and 10 also do not recite current sensing. Hart clearly

refers to sensing the average voltage of a load. Claims 3 and 10 recite sensed power supply voltage. It is therefore not clear how Hart would render current sensing obvious or why this would at all be relevant to the rejected claims.

Supposing, solely for the sake of argument, that one were to combine the average load voltage sensing in Hart into the power modules disclosed in Freige, this also would not render the claimed subject matter obvious. In such a combined system, each power module might sense its own average voltage, and use that sensed average voltage in its own voltage regulation. Thus, the per-module regulation mechanism in Freige discussed in detail above could arguably be modified to use a sensed average voltage in each module.

Turning now to claim 3, however, this claim clearly recites that each of the power sources is responsive to an average of the sensed power supply voltages sensed at a plurality of points in a power distribution network. Claim 10 similarly recites that the voltage of the supplied power is sensed at a plurality of points in the power distribution network, and that the currents supplied by the plurality of power sources are regulated in dependence upon an average of the sensed voltages at the plurality of points.

Thus, claims 3 and 10 explicitly recite an average over multiple sensing points, such that multiple power sources are regulated on the basis of an average supply voltage over those points. The average voltage that might be used in a combined system based on Freige and Hart would be a time average, wherein a different average voltage is used in each power module, and not an average over multiple points in a power distribution system, which average is used by all power modules in accordance with the claims.

It is respectfully submitted that the claimed average of sensed voltage patentably distinguishes claims 3 and 10 over the combined teachings of Freige and Hart.

Claims 6, 7, 13, and 14 stand rejected as allegedly being unpatentable over Freige in view of United States Patent No. 6,317,345 (hereinafter "Hayward"). The paragraph bridging pages 6 and 7 of the Final Office Action suggests that it would be obvious to modify Freige for implementation on a circuit card.

The Applicants first wish to note that such a modification would actually be contrary to the teachings of Freige. As described at lines 52 to 57 of Column 1 of Freige, for example, one goal of the invention is to provide power in such a way as to reduce the physical size of the system and the amount of heat produced by a system. Accordingly, a system user's work space is unencumbered with bulky, heat producing equipment. Column 3, lines 14 to 19 similarly refer to locating the power module remotely from a computer system, and putting the power module on the floor away from the user's work space. Clearly, the modular power supply system in Freige, and specifically the power modules thereof, are not intended for implementation on a circuit card.

Even if one were to combine the teachings of Hayward with those of Freige, which the Applicants submit would not be obvious, the subject matter of the rejected claims is patentable over any such combination. The combined teachings would lack at least the distinguishing features discussed in detail above in the context of the independent claims. For example, a combined system would not render obvious at least the claimed features relating to each of multiple power sources responsive to the sensed power supply voltage sensed by each of at least one voltage sensor and regulating current or power based on that sensed voltage.

It is therefore believed to be clear that claims 6, 7, 13, and 14 are patentable over Freige and Hayward.

Regarding claim 5, this claim was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Freige in view of United States Patent No. 5,952,733 (hereinafter "Johnston").

The Applicants also question the rationale for combining the teachings of Freige and Johnston. On page 7 of the Final Office Action, it is suggested that it would have been obvious to modify Freige to output different currents with different weights in order to increase the efficiency of the secondary convertors, based on the different voltages illustrated, for example, in Figure 5 of Johnston. How this would possibly increase the efficiency of the secondary convertors disclosed in Freige is not clear. Also, since Freige already discloses DC-to-DC convertors which are operable to change the first DC voltage produced by the power modules to a second regulated DC voltage selected from a plurality of programmed voltage values, it would

appear as though such different voltages are provided by Freige itself. No modification would therefore appear to be required to enable Freige to provide different voltage levels.

It is also unclear how the disclosure of different voltage levels in Johnston would render obvious any modifications to Freige to output different currents with different weights. Thus, even if one were to somehow to attempt to apply the teachings of multiple voltage levels in Johnston to the modular power supply system in Freige, any combined system would not provide for regulated currents with different relative weights, as recited in claim 5. Neither of the cited references teaches regulation of power source output currents, and accordingly current regulation would also necessarily be absent from any combination of the teachings of the two references.

It is thus respectfully submitted that claim 5 is patentable over Freige and Johnston.

Finally, claim 11 stands rejected as allegedly being unpatentable over Freige in view of Hart and further in view of Johnston. Supposing the teachings of Johnston were to be combined with the combined teachings of Freige and Hart, which the Applicants strongly contest on the basis that such a combination would not be obvious, the subject matter of claim 11 would not be rendered unpatentable.

In the paragraph bridging pages 7 and 8 of the Office Action, an analysis of claim 11 which is substantially the same as the analysis of claim 5 is presented. The difference between the analyses of claims 5 and 11 is that Johnston is relied upon in combination with Freige and Hart instead of Freige alone. This different basis for the rejection of claim 11 arises from the fact that claim 11 depends from claim 10, which as discussed in detail above includes an average sensed voltage feature. At least this feature, in addition to current regulation as recited in claim 9, from which claim 11 ultimately depends, would not be obvious from the combined teachings of the three cited references. The Applicants also note the further issues discussed in detail above with respect to combining Johnston with Freige in the first place.

Claim 11 therefore is patentable over the combination of Freige, Hart, and Johnston for at least these reasons.

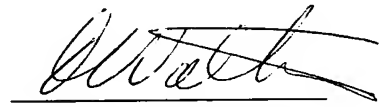
It is thus respectfully submitted that all of the rejected claims are patentable over the cited references. Reconsideration and withdrawal of the rejections under 35 U.S.C. 103 are respectfully requested.

The Applicants believe that the present application is in allowable form, and timely issuance of a Notice of Allowance is respectfully requested.

In the event that any issues remain to be resolved prior to allowance of the application, the Examiner is invited to contact the undersigned by telephone so as to most expediently resolve such issues.

In view of the foregoing, early favourable consideration of this application is earnestly solicited.

Respectfully submitted,

By 

David M. Walters
Reg. No. 53,904
Tel.: (613) 232-2486

Date: December 23, 2008

DMW:lsj